Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

In the Matter of	)	
	)	
Transforming the 2.5 GHz Band	)	WT Docket No. 18-120
	)	

COMMENTS OF MIDCONTINENT COMMUNICATIONS

Midcontinent Communications (Midco) supports the Commission taking action to transform the Educational Broadband Spectrum (EBS) 2.5 GHz band and efficiently allocate spectrum to meet America's ever-increasing connectivity needs, especially in rural America. While originally intended for interactive school television, the 2.5 GHz band has become increasingly commercialized.[1] The band's outdated rules have "led to significant underuse of this spectrum nationwide."[2] Midco, therefore, commends the Commission for considering the most efficient and effective use of this valuable spectrum.[3]

[1] *Commissioner Carr Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 3 ("EBS was a half-step towards liberalizing the band's use. We allowed educational institutions to lease the spectrum to entities that specialize in mobile broadband, such as wireless providers. But we kept requirements that limited the band's value and made little sense given trends in technology. For example, to this day, we require that licensees use each of the four channels of spectrum for educational purposes for 20 hours per week. That might have made sense when the 2.5 GHz band was used for TV, but what does the 20-hour mandate mean when the spectrum is being used for broadband?").

[2] *Commissioner O'Reilly Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 2.

[3] *Notice of Proposed Rulemaking* ("*NPRM*"), WT Docket No. 18-120 (May 10, 2018) at ¶ 1 ("Today, we propose to allow more efficient and effective use of this spectrum band by providing greater flexibility to current EBS licensees as well as providing new opportunities for additional entities to obtain unused 2.5 GHz spectrum to facilitate improved access to next generation wireless broadband, including 5G."); *see also Chairman Pai's Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 1 ("We need to get this valuable spectrum into the hands of those who will provide service[.]").

In revising the 2.5 GHz band rules, the Commission should balance commercial use of this band with the needs of educational institutions and Tribal Nations by adopting rules to encourage commercial development, while instituting requirements to serve educational institutions and Tribal Nations through the E-rate program, or a similar program. To that end, the Commission should do the following: rationalize incumbent licenses to counties or census tracts create as much white space for commercial use as possible; decline to open any local priority windows for EBS white space; auction white space in a competitive manner; use auction procedures that encourage rural broadband development; institute buildout requirements; and require all licensees to participate in the E-rate (or similar) program.[4]

Additionally, fixed wireless can use both the 2.5 band and the 3.5 GHz, Citizens Broadband Radio Service (CBRS), band to provide internet access to rural America. Thus, the Commission should, wherever possible, create similar rules for the auctions and licenses sizes for the 2.5 GHz and 3.5 GHz bands.

INTRODUCTION

Midco has a long history of innovation in the Upper Midwest. Founded in 1931, Midco began by operating movie theatres, then entered the radio business, and in 1954, owned the first television station in South Dakota. Then, on April 15, 1996, in Aberdeen, South Dakota, Midco launched its first broadband internet service.

Midco's commitment to innovation continues to motivate business initiatives today. In 2017, Midco launched its Gig Initiative, and Midco Gig is now available to more than 80% of customers, while the remaining fiber customers can receive speeds anywhere from 50 Mbps to

[4] While these Comments are focused on the EBS portion of the 2.5 GHz band, they would apply similarly to the Broadcast Radio Service (BRS) portion of the 2.5 GHz band, and the 3.5 GHz band in GN Docket No. 12-354.

250 Mbps. Currently, Midco serves more than 385,000 customers in 342 communities in South Dakota, North Dakota, Minnesota, Wisconsin, and the Lawrence area in Kansas.

Midco's history of innovation has continued in its efforts to serve customers in the most rural communities, where terrain or economic considerations make a fiber build difficult, if not impossible. In March of 2018, therefore, Midco acquired InvisiMax Inc., a fixed wireless provider with more than 10 years experience providing internet access in the Red River Valley in ND and MN.

Midco currently has 4,200 wireless customers and intends to expand its fixed wireless service more broadly in the most rural areas within its footprint. Current technology allows Midco to serve customers via fixed wireless 30-50 miles off of its fiber network. Figure 1[5] shows Midco's fiber footprint and current potential to serve rural communities with fixed wireless. The potential to serve remote, rural communities will only increase as Midco continues expanding its fiber network.

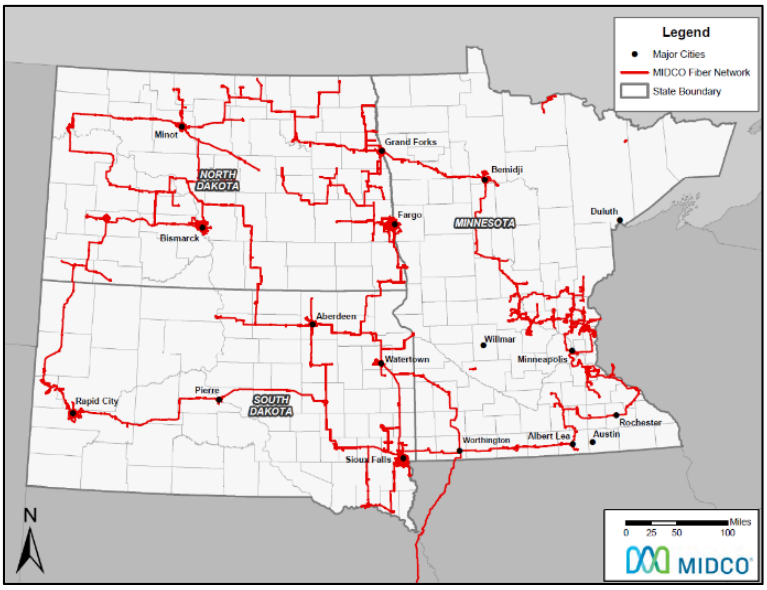

Figure 1:Midco's Fiber Footprint in SD, ND, and MN

Midco, however, needs access to spectrum in order to operate and expand its fixed wireless services, and to maximize speeds for consumers. Spectrum is needed during two phases in the fixed wireless broadband transmission. First, spectrum is needed to transmit the internet

[5] All of Midco's maps contained herein are attached in full size as Appendix 1.

signal between the fiber-fed backhaul point-to-point (PTP) tower and the point-to multi-point (PTMP) tower. Second, spectrum is needed for the transmission of the signal between the PTMP tower and the consumer's premises.

The 2.5 GHz band can be used for the PTMP connection to provide internet access at the fast speeds demanded by consumers. In recent field testing completed by Midco using carrier aggregation technology on the existing network (with an average of 7-8 miles between the PTP towers and the PTMP tower and consumer), Midco achieved speeds in excess of 200 Mbps download and 20 Mpbs upload using 80 MHz of spectrum from Midco's 3.65 GHz nationwide non-exclusive and experimental 3.5 GHz licenses.[6] Midco will need 80 MHz per location (40MHz East/West and 40MHz North/South) to offer these speeds.[7] The technology used in Midco's testing has achieved similar speed results using the 2.5 GHz band.[8]

Not only can the 2.5 GHz band be used in carrier aggregation technology, it is also appealing because its propagation characteristics can offer near non-line-of-site transmission and penetrate through trees. While Midco is committed to making a significant capital investment in this new technology, it must have access to spectrum to justify such investment.

[6] Midco tested the carrier aggregation technology using its 3.65 GHz nationwide non-exclusive license (File No. 8088440) and its 3.5 GHz experimental license (WJ2XG; File No. 0001-EX-AL-2018). Telrad, the manufacturer who completed this testing with Midco, has stated that Midco could achieve similar results in the 2.5 GHz band. *See* White Paper, Telrad, attached as Appendix 2.

[7] Due to the advancement in antenna technology in this band, Midco can reuse the 40Mhz on the East facing 90-degree antenna on the West facing 90-degree sector and the same for North/South configuration.

[8] *See* White Paper, Telrad, attached as Appendix 2.

Currently, however, Midco cannot hold a license in the 2.5 GHz band as the company is not a permitted licensee.[9] This is true even though, as shown in Figure 2, there are, as in many rural areas west of the Mississippi,[10] vast areas of rural land in SD, ND, and MN that lack any licensee.[11] Figure 2 does not even account for whether the current licensees are efficiently using their spectrum. Adding information on actual usage, especially usage to provide fast and reliable broadband, to the map would yield a far dimmer picture of 2.5 GHz spectrum use in the Upper Midwest. Given these concerns and the need for broadband access in rural America, Midco's suggestions for the Commission in revising the 2.5 GHz band rules are aimed at promoting the most efficient use of this spectrum in rural America.

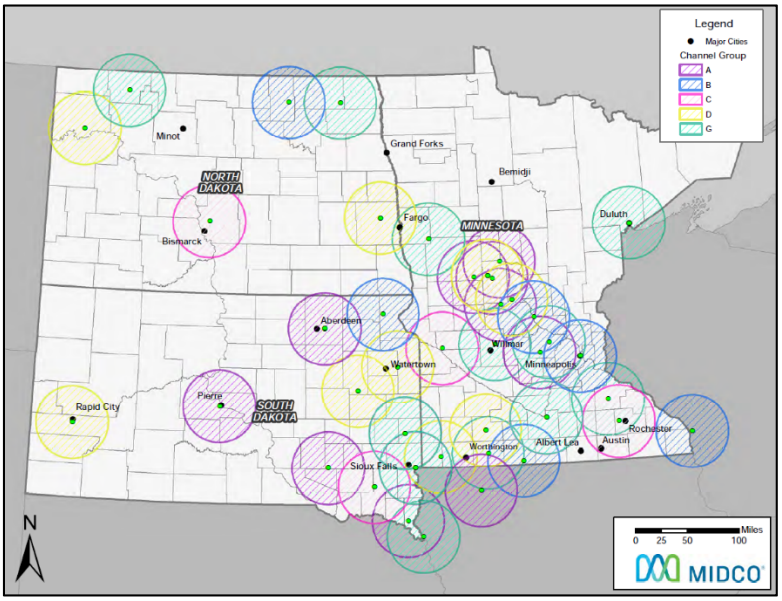

Figure 2: Incumbent Licenses in Midco's Footprint

[9] *NPRM* at ¶ 3.

[10] *NPRM* at ¶4 ("In the rest of the country, mostly rural areas west of the Mississippi River, the 2.5 GHz spectrum remains unassigned.").

[11] While Midco offers services in SD, ND, MN, WI, and KS, for simplicity, these Comments focus on SD, ND, and MN.

DISCUSSION

I. The Commission should rationalize incumbent licenses to create the most white space available for commercial use, institute buildout requirements for all licensees, and require participation in the E-rate program.

Rationalizing the incumbent 35-mile circular government service area (GSA) licenses to a more regular-sized license will result in more white space for commercial use. Although rationalizing incumbents to counties would work better for Midco as counties within our three-state footprint are somewhat regular in size, the most important goal in rationalizing incumbent licensees is to create large areas of white space between incumbents given the commercial nature of the 2.5 GHz band. Creating the greatest amount of white space possible will result in more efficient usage in the 2.5 GHz band,[12] and avoid "past spectrum policy mistakes."[13]

Rationalizing incumbent licenses is warranted as technology has changed dramatically since the Commission announced the initial 2.5 GHz licensing rules. When the rules were initially instituted, the internet did not yet exist. While the 2.5 GHz band was originally envisioned to transmit educational programming through dedicated channels, the transmission of educational materials now largely occurs over the internet.[14]

As the internet grew and educational institutions stopped using the 2.5 GHz band for educational broadcasting, the band became more commercialized. The Commission now "estimate[s] that more than 90 percent of the EBS licenses held by educational institutions are

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[12] Regardless of the rationalization shape chosen, the Commission should not, as suggested, maintain current GSAs, as the 35-mile circular GSA results in overlap and large areas of unused 2.5 GHz spectrum. *See, e.g.*, *NPRM* ¶ 18 ("In the alternative, should we simply have existing licensees maintain their current contours, rather than rationalizing existing holdings?")

[13] *Commissioner O'Reilly Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 3.

[14] *See, e.g.*, *NPRM* at ¶ 2 (discussing ITFS and EBS).

leased to other entities."[15] In Midco's footprint this percentage is higher—over 98% of licenses are leased to, owned by, or associated with a commercial provider. Of the approximately 102 licenses in SD, ND, and MN,[16] only 29 lack a commercial lease. Of those 29, 23 are held by commercial telecommunications providers; leaving only 6 licenses where an educational institution is the licensee. Of those 6 licenses, 2 indicate out-of-state license-holders and commercial use of the license,[17] and 2 of the remaining 4 licenses indicate leases that recently expired and/or have pending lease applications.[18] Consequently, of the 102 licenses currently held, only 2 are licensed to educational institutions with no disclosed commercial connection. This data confirms the Commission's finding, and the reality, that 2.5 GHz band use is largely commercial. In recognizing this reality, the Commission should now take appropriate steps for commercial providers to use this spectrum to close the digital divide.

A. The Commission should rationalize incumbent licenses to either census tracts or counties if the GSA covers at least 80% of the census tract or county based on geography.

The Commission seeks comment on whether to rationalize incumbent licenses to census tracts, counties, or some other geographic area. For clarity and ease of administration, the Commission should rationalize incumbents to the same-sized license for the EBS white space that it will auction to commercial providers after the rationalization process. Creating uniformly sized licenses will further Commission policy:

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[15] *Commissioner Carr Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 5.

[16] Searches within the Commission's ULS System were current as of July 29, 2018.

[17] *See, e.g.,* WND328, *Morningstar Educational Network* from California; WND329, *Shekinah Network* from Oklahoma.

[18] *See, e.g.*, WHF247, *Iowa Lakes Community College* (expired lease for Starcom); WND311, *Melrose Area Public School District #740* (expired lease for Wisper Wireless Solutions).

> The Commission traditionally has recognized that a spectrum policy based on flexible use in *regular geographic areas* has several advantages. Such flexible use licensing can promote broadband deployment, ensure the spectrum is put to its most beneficial use, allow licensees to respond to consumer demand for new services, and maximize the probability of success for new services.[19]

The question of rationalization, therefore, becomes a question of what size license the FCC should issue for all licenses in the 2.5 GHz band.

The Commission is correct to focus on census tracts or counties for license size in the 2.5 GHz band. Larger-sized licenses would, for all factual purposes, prohibit competitive use and rural deployment, as only large, national carriers could afford to purchase such licenses. The Commission, therefore, should use only census tracts or counties for license size.

As shown in Figures 3 and 4, in Midco's footprint, both counties and census tracts yield regular geographic boundary areas, unlike other potential geographic areas, such as a partial economic area (PEA):

[19] *NPRM* at ¶ 19 (emphasis added).

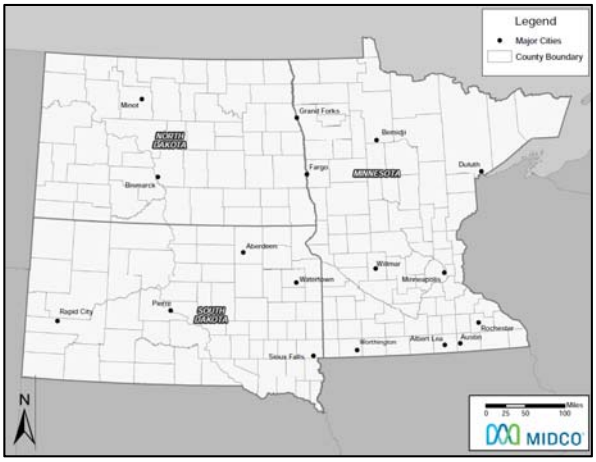

Figure 3: County Boundaries in Midco's Footprint

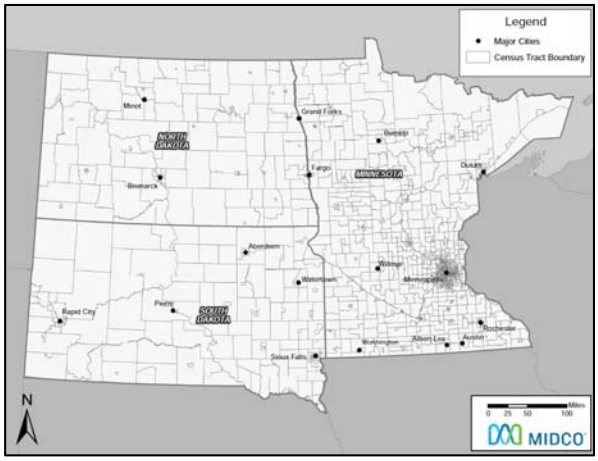

Figure 4: Census Tract Boundaries in Midco's Footprint

While counties would be easier for Midco to administer given the uniformity of many counties within this footprint, Midco could also engineer its fixed wireless system with census-tract-sized licenses.

More importantly, the Commission should not create rules that would provide a spectrum windfall to incumbent licensees. For example, using a geographic area larger than a county, such as a PEA, would result in an unwarranted windfall of spectrum to incumbents who have not efficiently used the 2.5 GHz band. The EBS band was initially allocated to local educational institutions to service their students and communities with *local*, educational broadcasts. It would, therefore, be an extraordinary allocation of precious and valuable spectrum to rationalize a GSA to a large PEA. Additionally, as acknowledged by the Commission, the licensees are likely to flip their licenses to a commercial lessee, resulting in a large allocation of spectrum without competitive and fair bidding.[20]

[20] *See, e.g.*, *Commissioner O'Reilly Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 3 ("It is one thing to allow long-standing incumbents greater flexibility to put their spectrum to better use or participate in the secondary market, it is quite another to issue new licenses for free or on the cheap, which then–consistent with EBS tradition–could be immediately leased or flipped to commercial providers.").

The Commission also should employ a minimum percentage threshold based on geography in rationalizing incumbent licenses. As an initial matter, the Commission questions whether a threshold should be based on geography or population,[21] and the most logical answer is to use geography. Population is fluid, and predicting population shifts is difficult. This is especially true in Midco's footprint, where movement of younger generations from rural communities to towns and cities for education and job opportunities can cause significant population shifts. Also, the census, upon which population data would be based, only occurs every 10 years, meaning the data used would be stale.

To yield the greatest white space possible for auction, and thereby the most efficient spectrum use, the Commission should use an 80% threshold based on geography, regardless of whether rationalization is to the census tract or county level. Figures 5 through 8 below confirm that rationalization to 80% of either census tracts or counties would yield much more white space than if the Commission did not use any threshold for rationalization.

[21] *NPRM* at ¶¶ 12, 17.

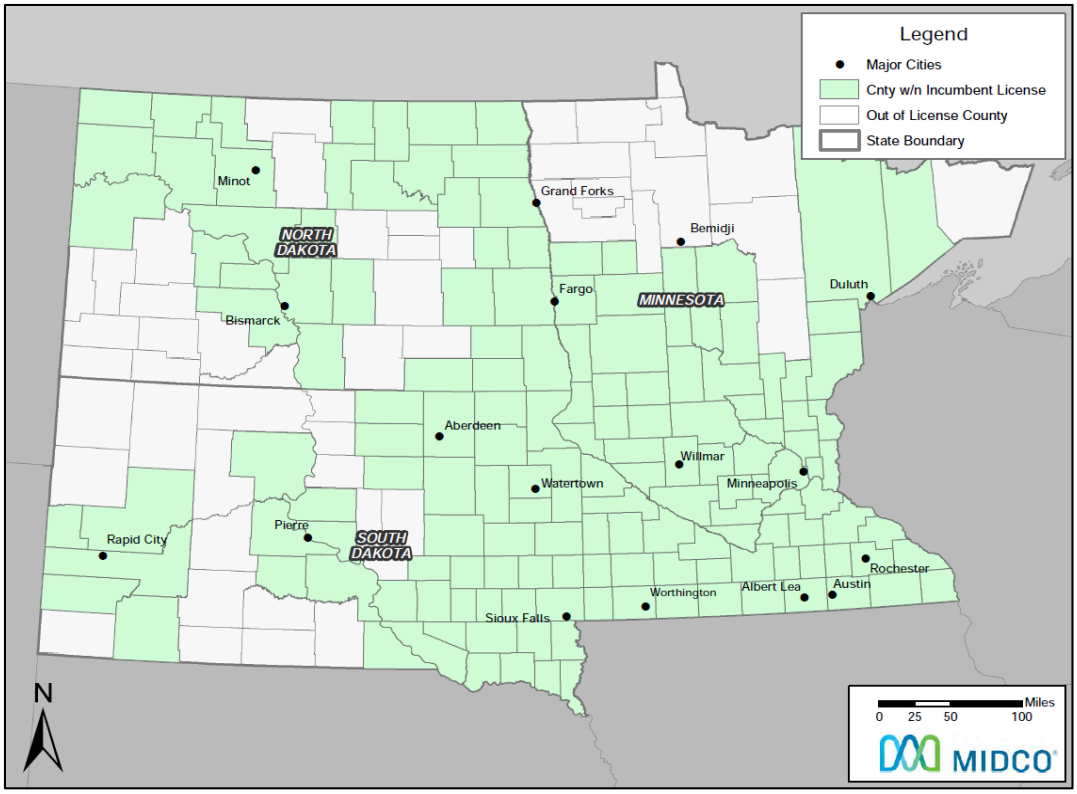

Figure 5: All Counties within Incumbent Licenses

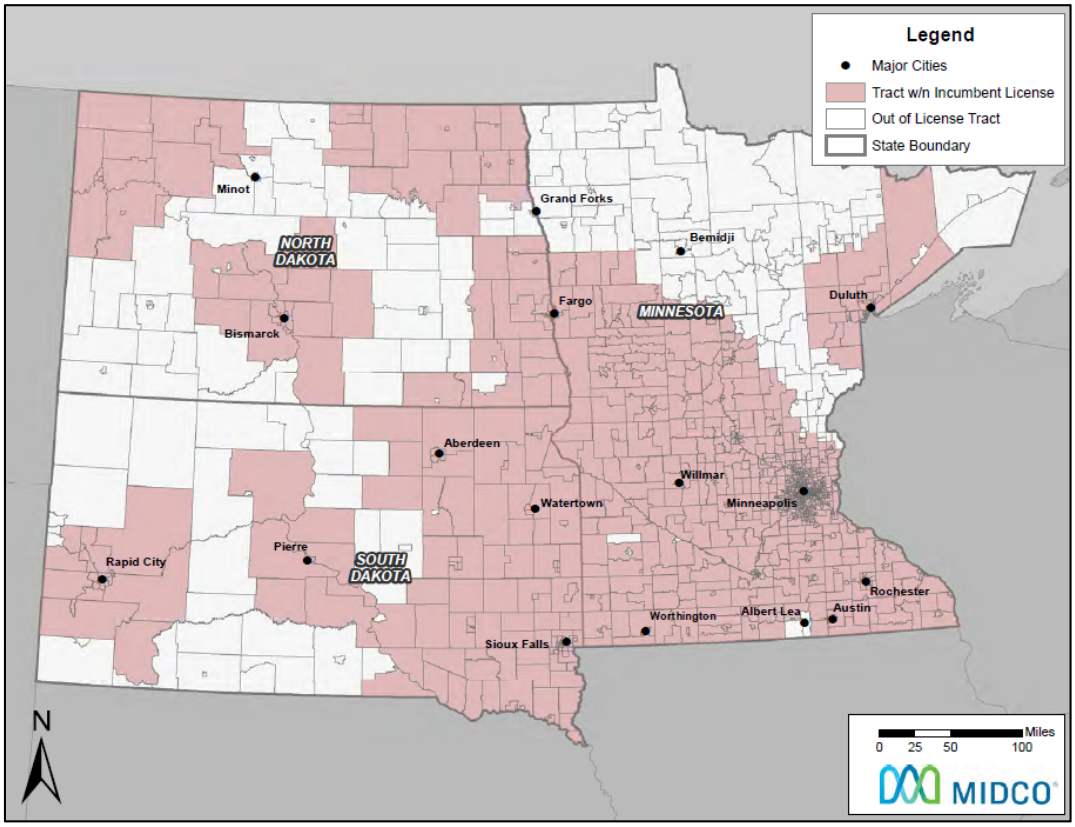

Figure 6: All Census Tracts within Incumbent Licenses

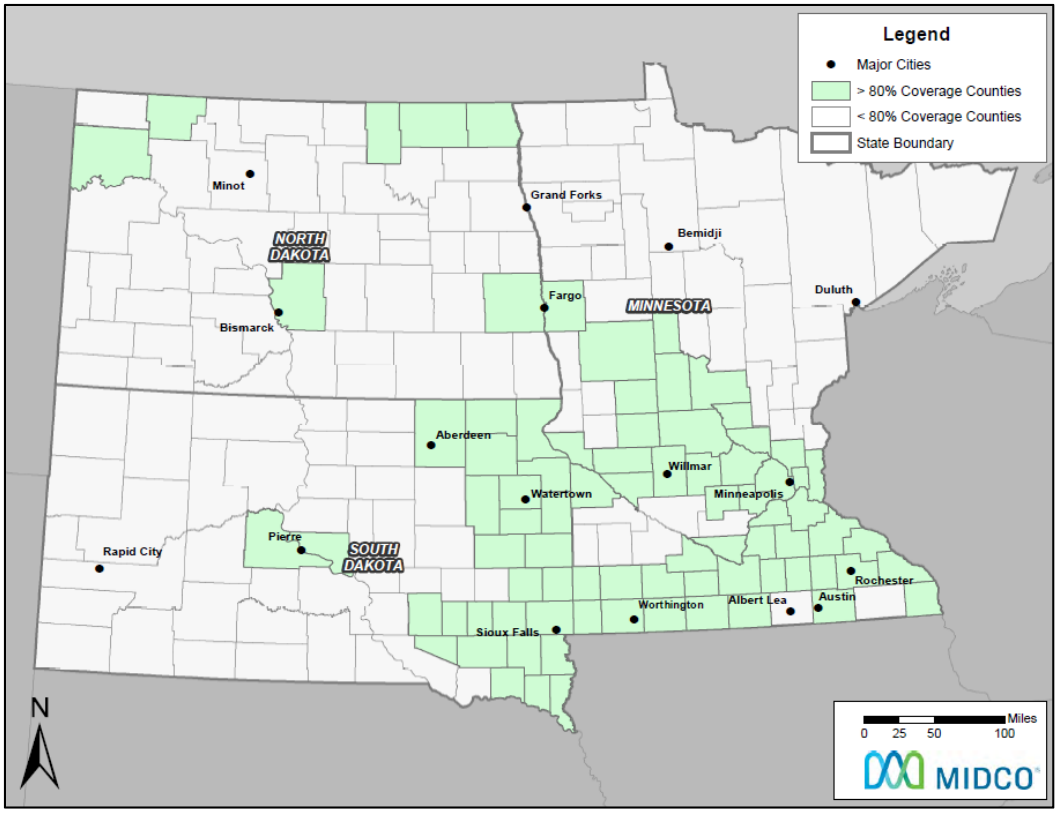

Figure 7: Incumbents Rationalized to 80% of County Geography

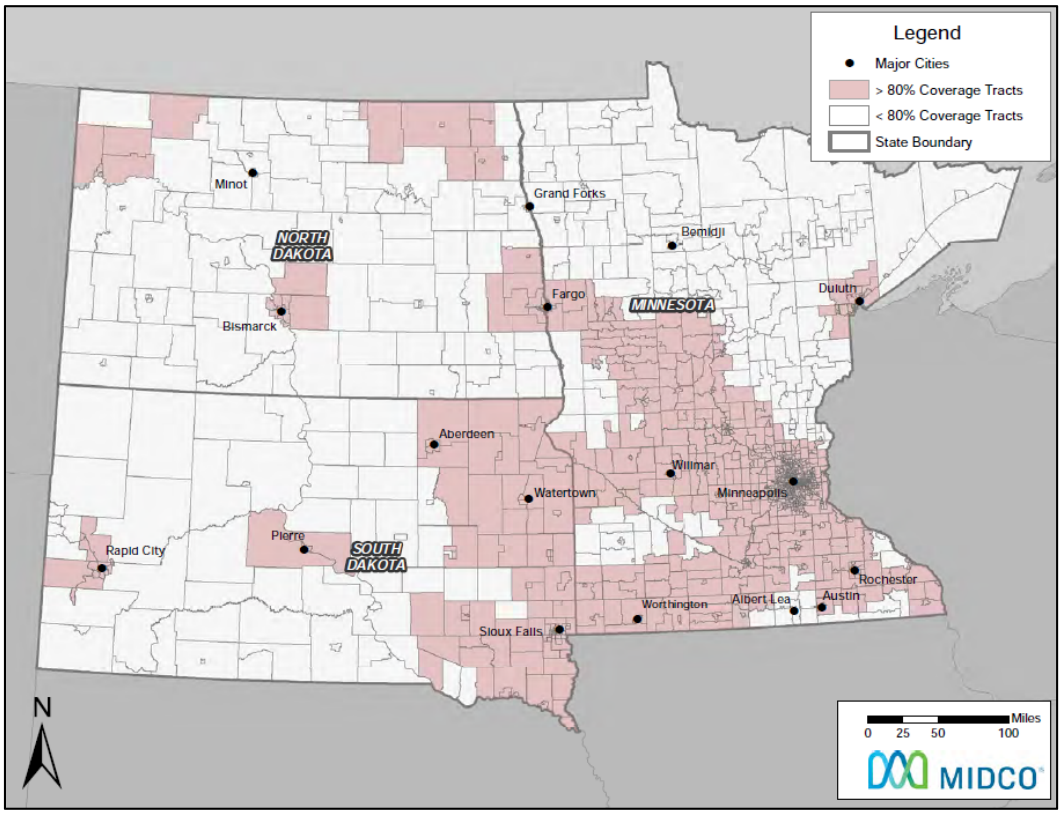

Figure 8: Incumbents Rationalized to 80% of Census Tract Geography

B. The Commission should balance commercial use of the 2.5 GHz band with the educational intentions for the band by instituting buildout requirements and requiring participation in the E-rate program for all licensees.

The Commission should use a balanced approach to regulating the 2.5 GHz band to encourage commercial use, while maintaining the original, educational intentions for the band. To that end, the Commission should create buildout requirements for incumbents and new licensees, while requiring all licensees to participate in the E-rate program or similar educational program.[22]

Significant amounts of commercial broadband data already flow through the 2.5 GHz band, and flexible ownership rules will ensure that as much of the spectrum is available for rural broadband use as possible. A number of the Commission's proposals further this important commercial use, including the proposals to: revise or eliminate the educational use requirements for incumbents; allow incumbents to assign or transfer their licenses; eliminate the restrictions on leases; and allow incumbents granted licenses via waiver to lease, assign, or transfer their license.[23]

The Commission can balance new commercial uses with educational and Tribal needs by requiring licensees to participate in the E-rate (or similar) program throughout each licensed area.[24] Midco is currently a participant in the E-rate program, and has seen a real public benefit to providing broadband to rural and other high-need schools, because students then have access to broadband for classes and to complete homework. Midco has also provided broadband

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[22] *Commissioner Carr Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 6 (noting that the E-rate program provides enhanced online learning opportunities).

[23] *NPRM* at ¶¶ 20-23.

[24] *Commissioner Carr Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 6.

services through the E-rate program to libraries, where free internet access is then provided to communities. Mandatory participation in the E-rate program for all 2.5 GHz licensees throughout each licensed area would help bridge the Homework Gap,[25] and provide even more Americans with access to broadband.

To ensure the ability of a licensee to provide services under the E-rate program (and to ensure the *actual use* of the spectrum), the Commission should implement the same buildout requirements for both incumbent and new licensees. Implementing the same buildout requirements for all licensees will also eliminate the legal uncertainty of the current requirement of "substantial service" and resulting inefficient spectrum use,[26] and answer the Commission's questions about the incumbents' historic use of the 2.5 GHz band.[27] The Commission should adopt the following proposed benchmarks:

> For mobile and fixed point-to-multipoint services, we propose an interim benchmark of 50 percent population coverage and a final benchmark of 80 percent population coverage. . . For educational broadcast services, we seek comment on an interim benchmark of 50 percent population coverage and a final benchmark of 80 percent population coverage.[28]

For broadband services, the Commission should also institute a minimum required speed threshold of at least 25 Mbps download and 3 Mbps upload, with no data caps, to ensure the most efficient and effective use of the 2.5 GHz band. The Commission should require showing

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[25] *See generally Commissioner Rosenworcel Statement*, WT Docket No. 18-120 (May 10, 2018) (discussing the Homework Gap).

[26] *See NPRM* at ¶ 52 & n.71-76 (summarizing current performance requirements for EBS and BRS licensees).

[27] *See NPRM* at ¶ 60 (seeking comments about incumbents).

[28] *NPRM* at ¶ 54. The Commission also proposes benchmarks for PTP uses, but the 2.5 GHz band is best used in a PTMP, fixed wireless environment. The Commission's rules, therefore, should support and encourage PTMP, and not PTP, use of the 2.5 GHz band in rural America.

of these benchmarks in a five-year time period, with the initial benchmark due three years from the date the license is rationalized (for incumbents) or the date the license is awarded after auction (for new licensees).[29]

In fairness, and to further ensure compliance with buildout requirements, the Commission should issue separate licenses for each county or census tract to which an incumbent GSA is rationalized.[30] Requiring a buildout for each county or census tract ensures that licensees are efficiently using the spectrum.

II. The Commission should not create any local priority windows, because it can meet educational and Tribal needs through the E-rate program.

Prior licensing regulations largely resulted in commercial leases, and therefore, commercial use of the 2.5 GHz spectrum. Given this reality, the Commission should not create any local priority windows, and, instead, should encourage as much of the 2.5 GHz band to be auctioned for commercial use as possible.

As acknowledged by the Commission, and as analyzed in Section I *supra*, the vast majority of incumbents are currently leasing their licenses to commercial broadband providers. As acknowledged in comments, many of these incumbents then receive broadband services from the lessee as part of the lease.[31] Even commentators who do not currently have licenses

[29] *NPRM* at ¶ 54 (seeking comment on when the benchmark showings should be required).

[30] *See NPRM* at ¶ 11; *NPRM* at ¶ 17.

[31] *See, e.g.*, Comment from Jolene Franciskovich, Coal City Public Library District, WT Docket No. 18-120 (filed July 26, 2018); Comment from Emily Faulkner, WT Docket No. 18-120 (filed July 25, 2018); Comment from Telecommunications Users Group, WT Docket No. 18-120 (filed July 31, 2018); Comment from David Elsbree, Teacher at Pathways Charter School, WT Docket No. 18-120 (filed July 31, 2018); Comment from Louise Lee, Butte College, WT Docket No. 18-120 (filed July 31, 2018).

commented on their desire to receive broadband through their license.[32] If incumbents use their licenses as a means to ultimately receive broadband services from potential lessees, and new institutions seeking licenses want to use their licenses similarly, the Commission should bypass the educational institution as an intermediary in the provision of broadband service. Instead, educational institutions and Tribal Nations can receive the broadband they seek, and deserve, through the E-rate program.

Doing otherwise risks repeating past mistakes whereby educational institutions applied for licenses, then leased or flipped the licenses to a commercial provider, which is unfair and will unjustly enrich the lessee as it will not be required to compete with other providers during an auction.[33] Without a fairly designed and competitive way to access spectrum, use of the 2.5 GHz band becomes significantly less desirable for commercial buildout.[34]

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[32] *See, e.g.*, Letter from Richard Torstick, President of Torstick Ministries Inc., WT Docket No. 18-120 (dated May 2018); Letter from Dr. Robert Benson, Superintendent King George County Schools, WT Docket No. 18-120 (dated June 3, 2018); *see also* Letter from Loris A. Taylor, President and CEO of Native Public Media, Inc. (dated July 26, 2018) ("NPM [Native Public Media] agrees with the Commission on the bedrock principle that 'members of federally-recognized American Indian Tribes and Alaska Native Villages and other residents of Tribal lands have lacked meaningful access to wired and wireless communications principles.' " (citing NPRM at ¶ 35)); Letter from Charles F. Wood, Chairman Chemehuevi Indian Tribe, WT Docket No. 18-120 (dated June 28, 2018) ("rural Native Nations have inadequate access to broadband service").

[33] *NPRM* at ¶ 28; *see also Commissioner O'Reilly Statement*, WT Docket No. 18-120 (May 10, 2018) at ¶ 3 ("I am troubled about the possibility of repeating past spectrum policy mistakes by creating new local priority filing windows for preferred entities. It is one thing to allow long-standing incumbents greater flexibility to put their spectrum to better use or participate in the secondary market, it is quite another to issue new licenses for free or on the cheap, which then–consistent with EBS tradition–could be immediately leased or flipped to commercial providers. Why would we enrich such middlemen? Why would we continue the EBS charade and would doing so even be consistent with the law?")

[34] *NPRM* at ¶ 28 ("What effect might these priority windows have on the attractiveness of the remaining spectrum for other applicants?").

Declining to allow new priority filing windows will also reduce or eliminate difficult administrative complications, including: resolving mutually exclusive applications; crafting an appropriate holding period given the largely commercial uses of the licenses; and harmonizing educational use requirements between incumbents and new licensees.[35] For these reasons, the Commission should decline to create any new, local priority filing windows.

III. The Commission should auction as much of the 2.5 GHz band as possible and ensure that rural providers have the ability to purchase spectrum during the auction to close the digital divide.

In lieu of local priority windows, the Commission should auction as much EBS white space in the same-sized licenses as used during the incumbent rationalization process, and use the auction proceeds to further educational programs. Using the same-sized license for new licenses is not only fair given the proposal to rationalize incumbent licenses to census tracts or counties, but it will also avoid creating irregular and difficult-to-manage white spaces.[36]

The Commission should consider an incentive auction to encourage incumbents to relinquish voluntarily some or all of their spectrum usage rights, and/or an overlay auction to ensure that as much spectrum as possible is auctioned and used.[37] The Commission may also consider using the proceeds from an auction to fund programs to close the Homework Gap.[38]

The Commission should also revise the channel size to be auctioned. While the current license size of 5.5 to 6.5 MHz channels may have worked well for educational broadcast when

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[35] *NPRM* at ¶¶ 45-48.

[36] *See NPRM* at ¶ 50 (seeking comment on the size of licenses to be auctioned).

[37] *See NPRM* at ¶ 61.

[38] *See generally Commissioner Rosenworcel Statement*, WT Docket No. 18-120 (May 10, 2018) (discussing the Homework Gap).

the blocks were originally allocated for analog video transmission, the change from analog to digital video transmission has made the need for these channel sizes obsolete. Further, channel sizes of 5.5 to 6.5 MHz are not ideal for fixed wireless providers. To use carrier aggregation technology, Midco needs 80 MHz in 2.5 GHz band. The carrier aggregation technology, however, can only aggregate channels that are in multiples of 5, such as 10 MHz, 20 MHz, etc. Current channel blocks of 5.5 to 6.5 MHz are not only more difficult to engineer and manage, any spectrum awarded in between 5 and 10 MHz cannot currently be aggregated and would not be put to its most efficient use. The Commission, therefore, should auction spectrum in channel sizes of at least 10 MHz or 20 MHz.[39]

The Commission also seeks comment on penalties for a licensee who cannot meet the benchmarks.[40] While the Commission knows best how to enforce its regulations, the Commission may consider allowing a defined cure period, such as ninety days, in which a licensee would need to meet a required benchmark. Allowing such a cure period would account for difficult conditions in meeting milestones, such as rugged terrain, issues with local authorities in permitting or executing pole attachment agreements, or other unknown impediments to full deployment. After one or two cure periods, the Commission should then revoke a license and periodically re-auction revoked licenses.

Similar to standardized penalty procedures, the Commission should also bring all licenses under the unified regulatory renewal framework for Wireless Radio Services (WRS).[41]

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[39] *See NPRM* at ¶¶ 50, 59 (seeking comment on channel size).

[40] *NPRM* at ¶ 54.

[41] *NPRM* at ¶ 55.

Assuming that licensees have met the required benchmarks, they should be allowed to continue renewing their licenses under WRS framework to avoid any disruption in service.

Most importantly, however, the public interest is best served if local companies committed to providing broadband to unserved or underserved areas in rural America are able to compete for licenses during the auction. Midco encourages the Commission during its public notice process to develop auction procedures for the 2.5 GHz band to best serve rural America, such as adopting auction terms that would grant preferential treatment to licensees who commit to build broadband in rural America.[42] The Commission may also modify the spectrum screen for the 2.5 GHz band to further rural broadband deployment.[43] Midco supports limitations on spectrum ownership to ensure that one or more large national carriers do not again control the majority of licenses (or leases) to the detriment of local broadband providers.

CONCLUSION

For the reasons stated above, the Commission should do the following: automatically rationalize incumbent EBS licenses to census tracts or counties to create as much EBS white space as possible; decline to open any local priority windows; auction all remaining EBS white space in the same-sized licenses as awarded to incumbents; institute rules to encourage rural providers to compete in the auction; require all licensees to be subject to buildout requirements; and require all licensees to participate in the E-rate (or similar) program throughout their license area to support the original, educational intentions for the 2.5 GHz band.

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[42] *See NPRM* at ¶ 51 (noting that the Commission would initiate a public notice process to solicit public input on certain details of auction design); and *NPRM* at ¶ 62 (seeking comment on potential preferential treatment of some applicants).

[43] *NPRM* at ¶ 24.

August 8, 2018.

Respectfully submitted,

MIDCONTINENT COMMUNICATIONS

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Appendix 1
Full-Size Midco Maps

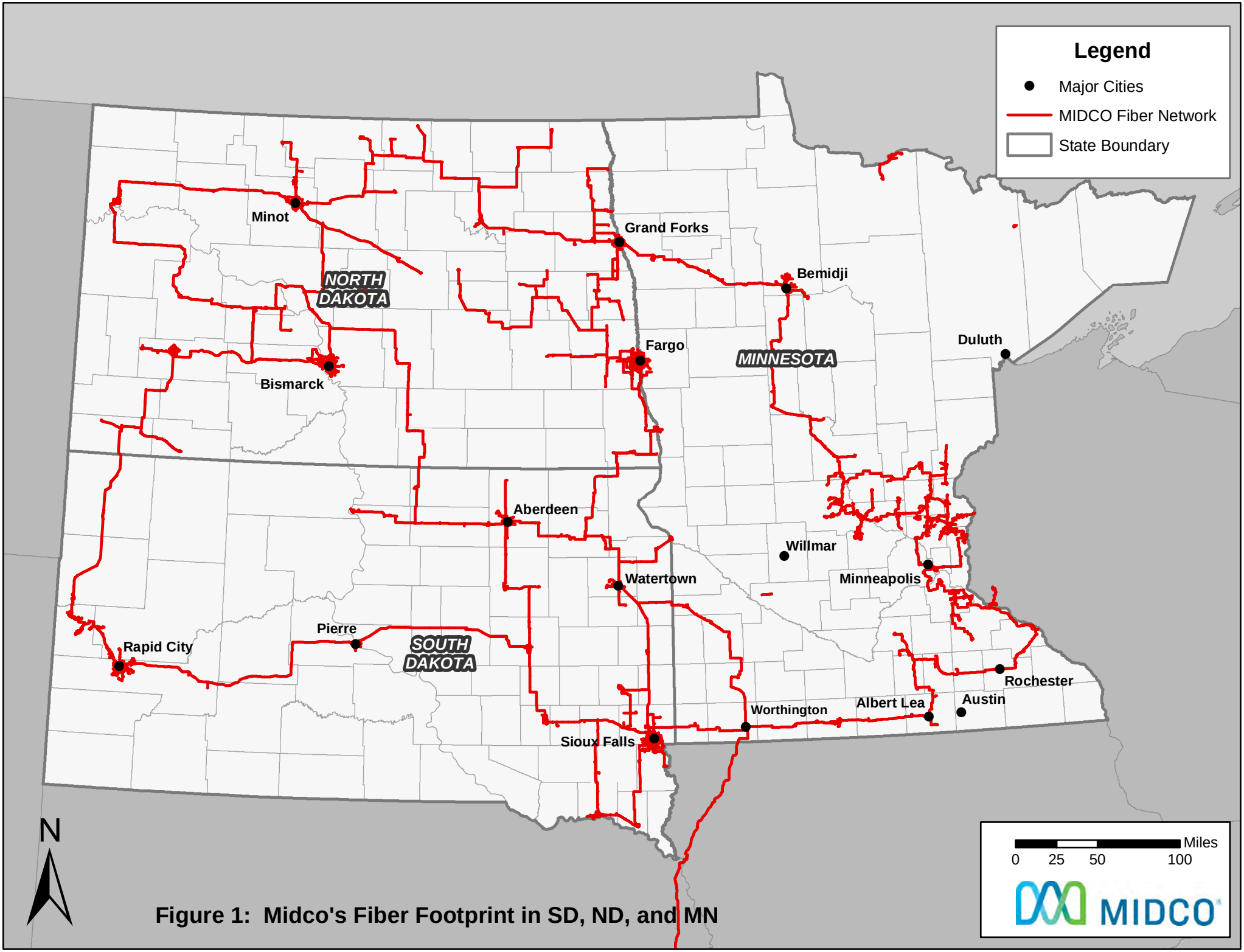


Figure 1: Midco's Fiber Footprint in SD, ND, and MN

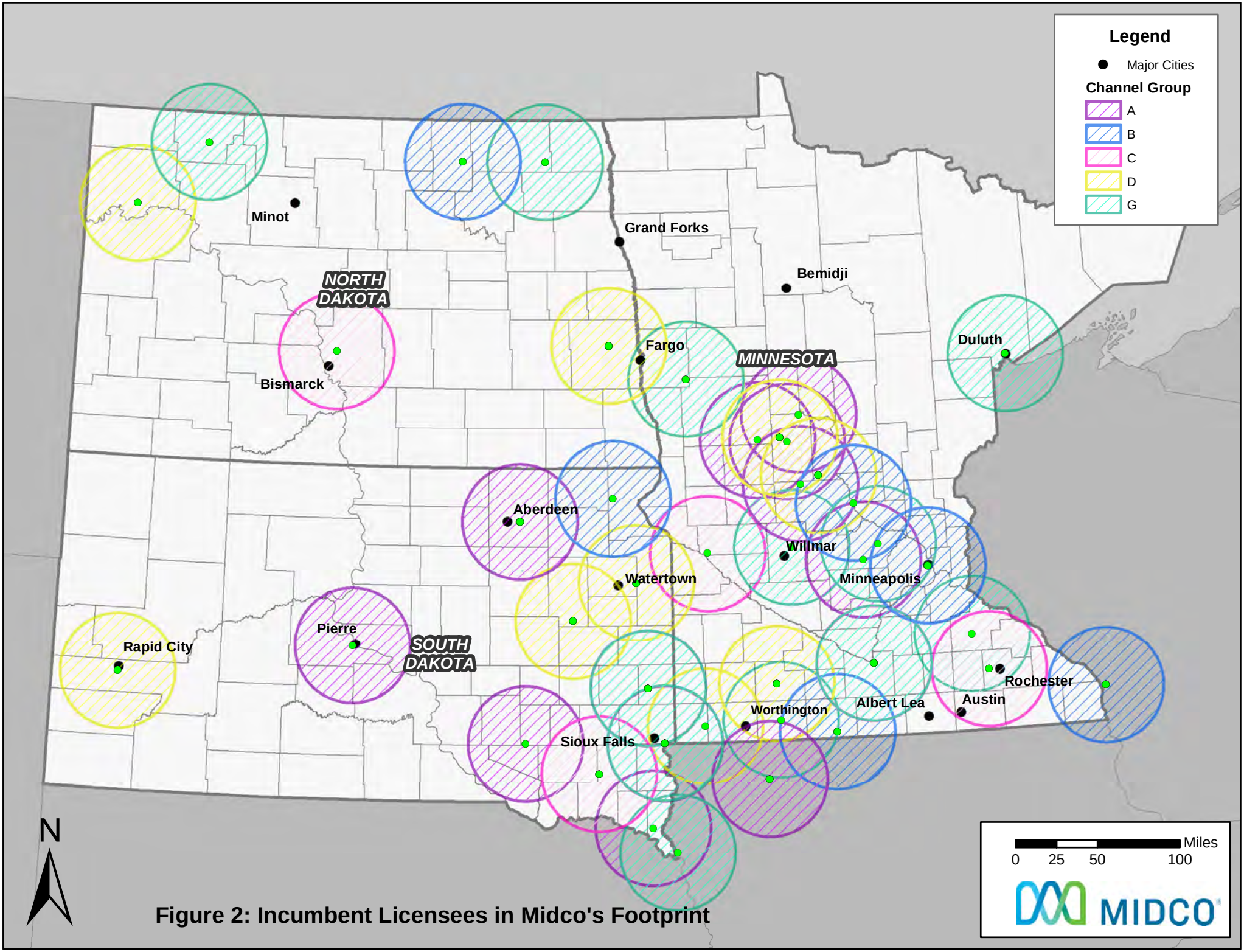


Figure 2: Incumbent Licensees in Midco's Footprint

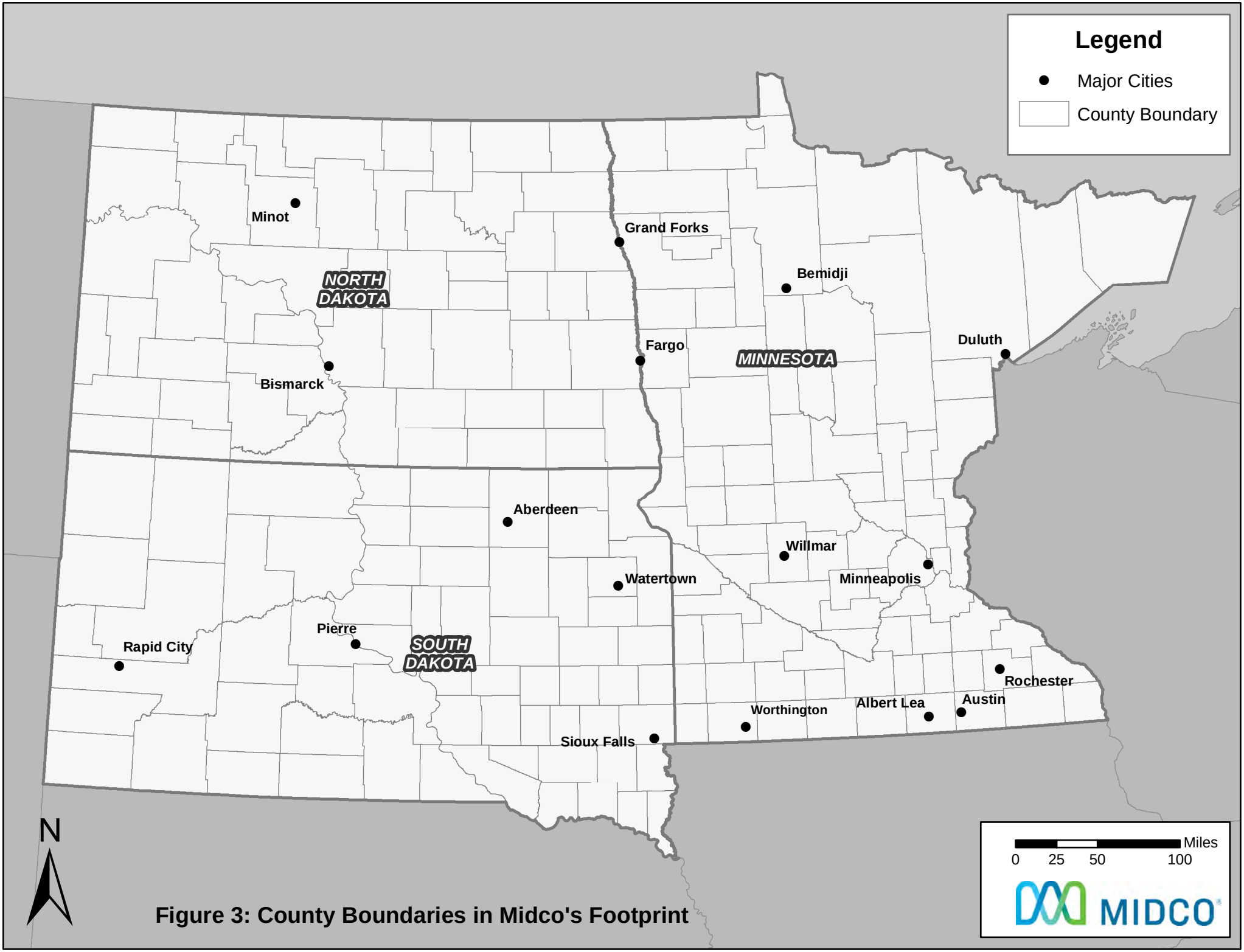


Figure 3: County Boundaries in Midco's Footprint

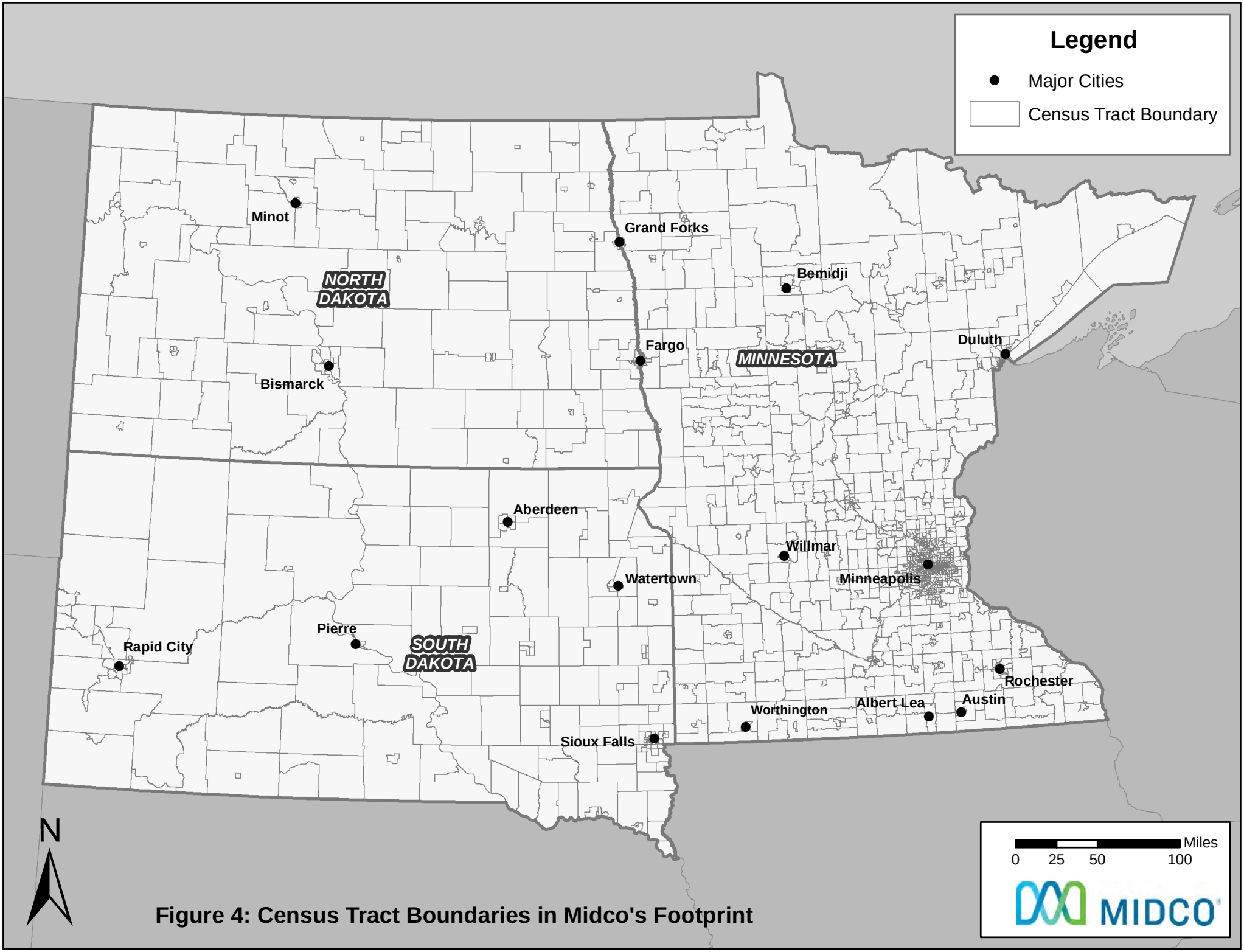


Figure 4: Census Tract Boundaries in Midco's Footprint

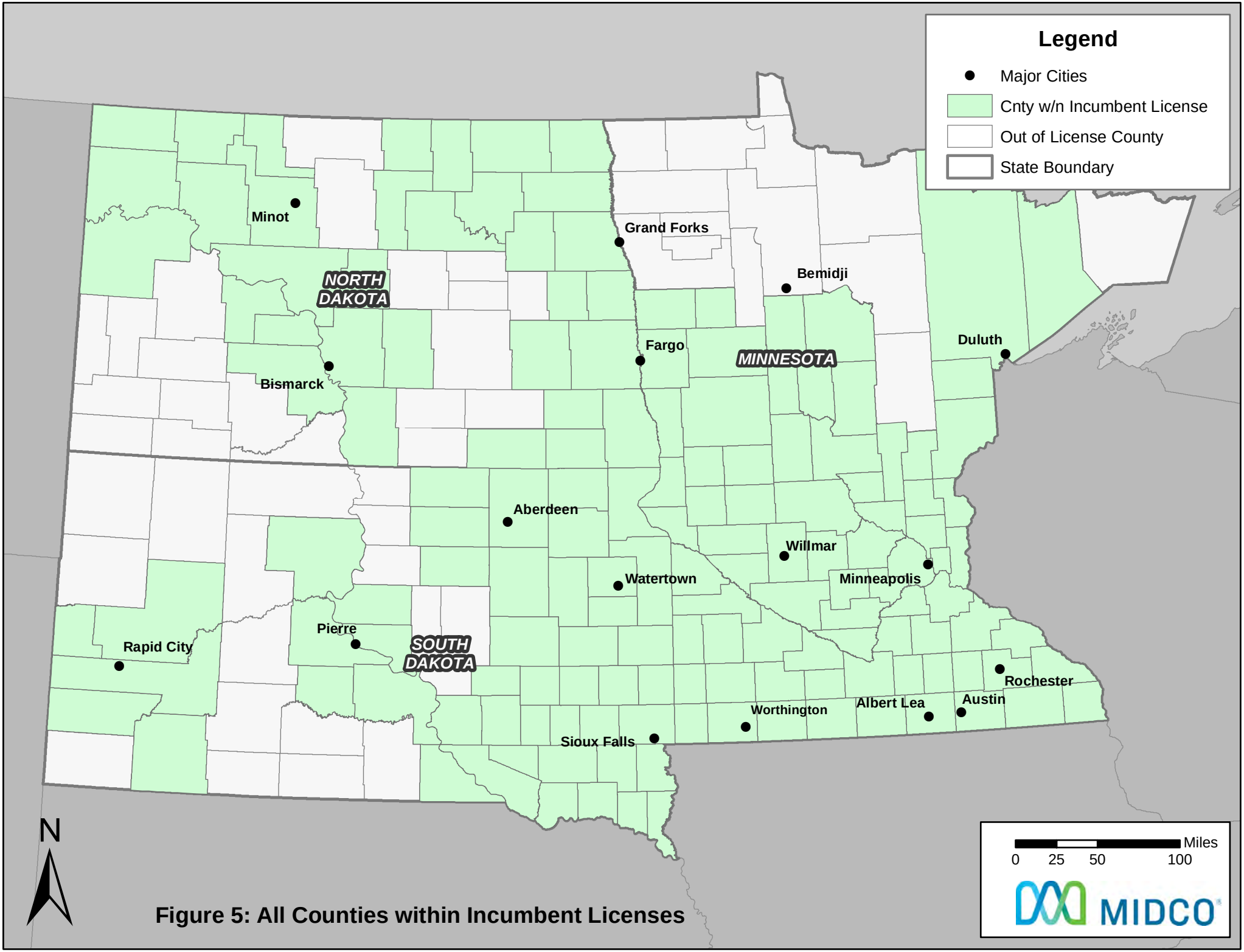


Figure 5: All Counties within Incumbent Licenses

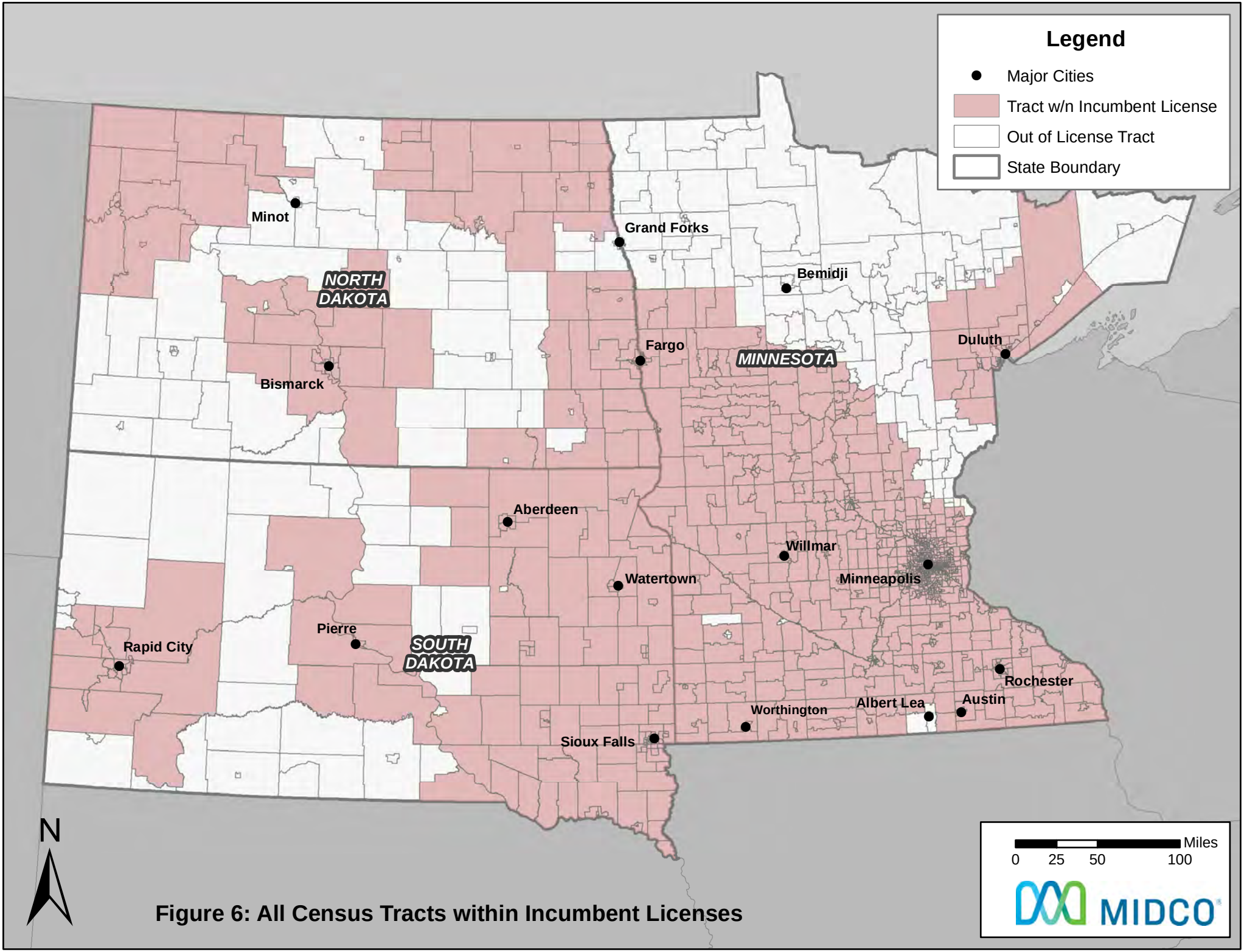


Figure 6: All Census Tracts within Incumbent Licenses

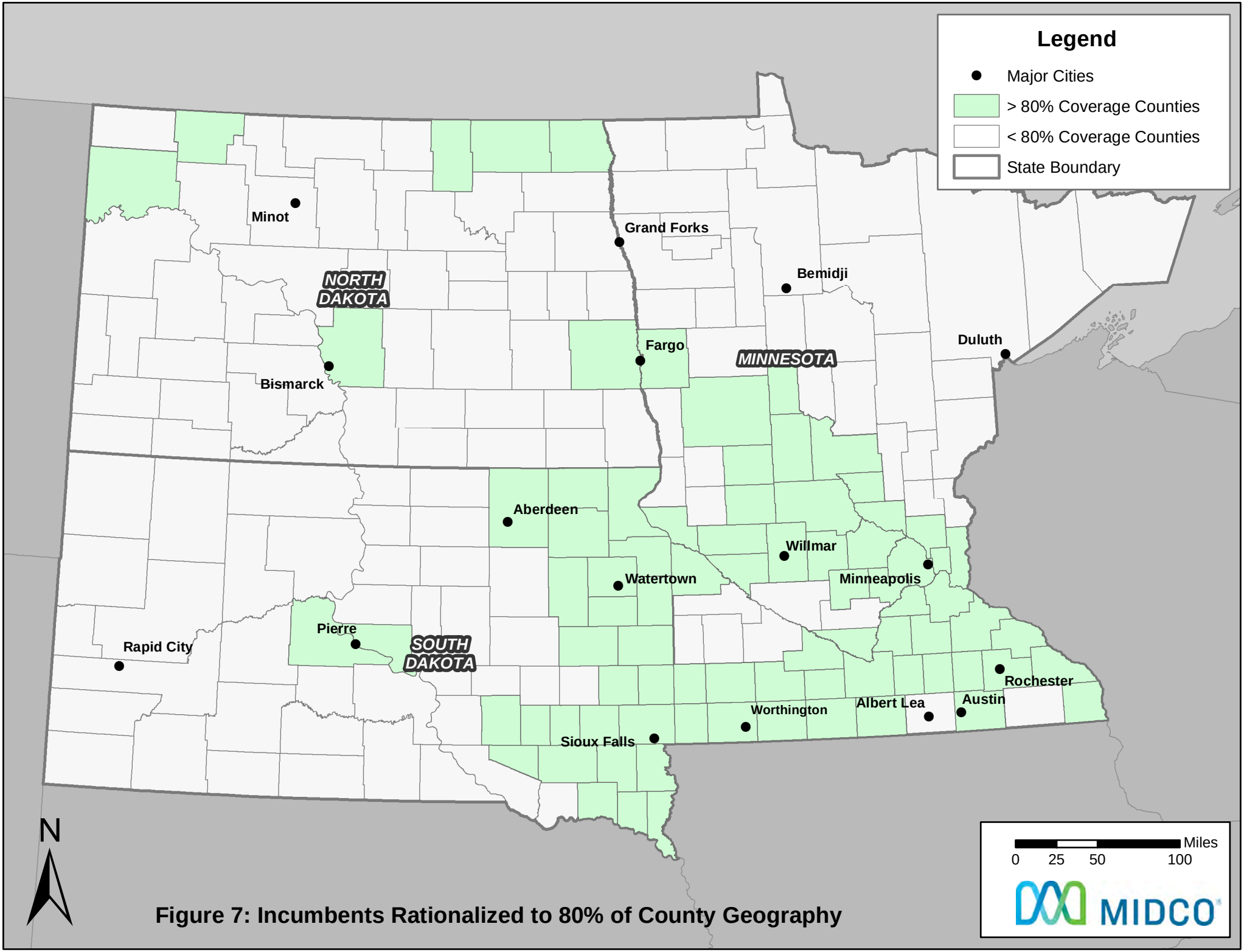


Figure 7: Incumbents Rationalized to 80% of County Geography

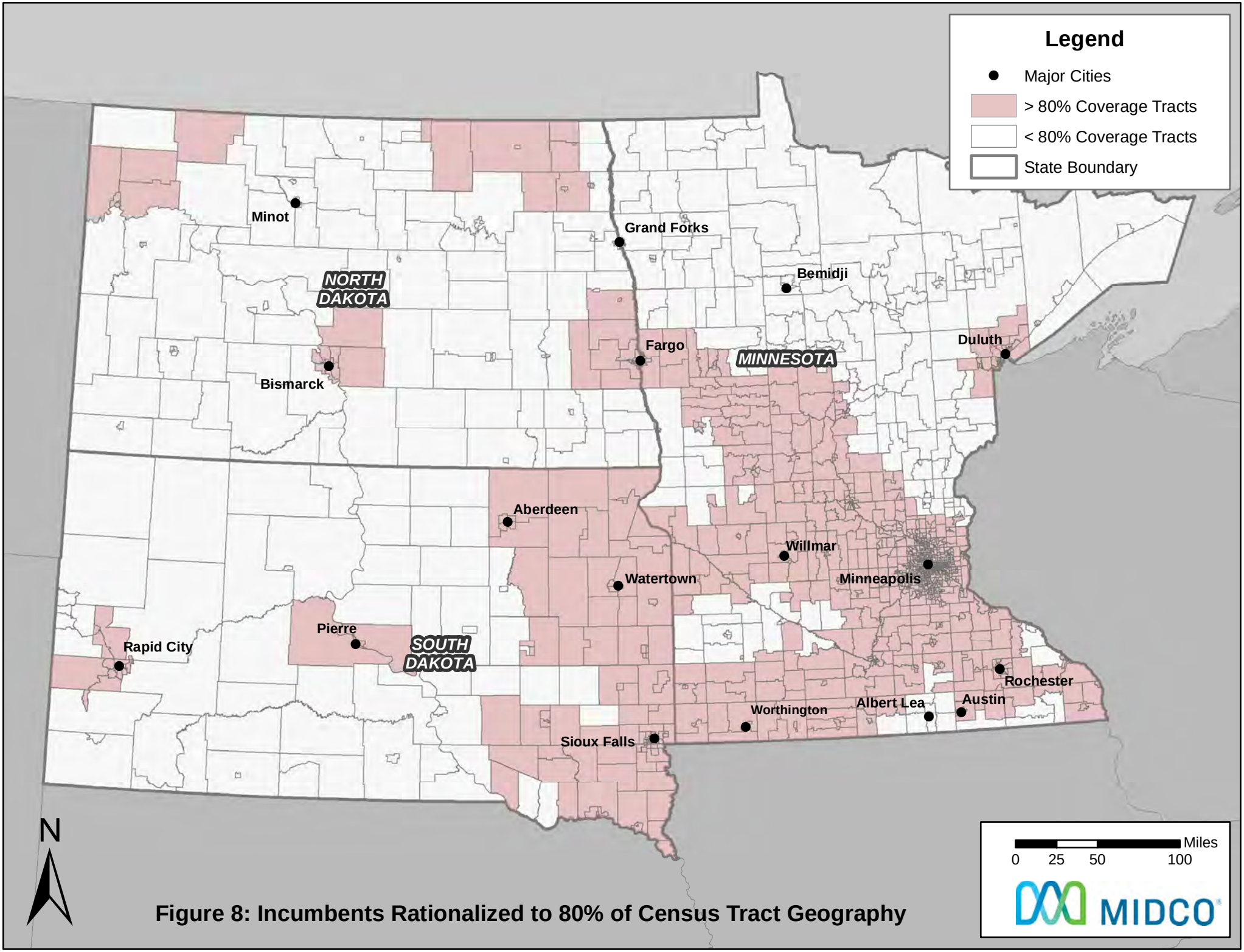


Figure 8: Incumbents Rationalized to 80% of Census Tract Geography

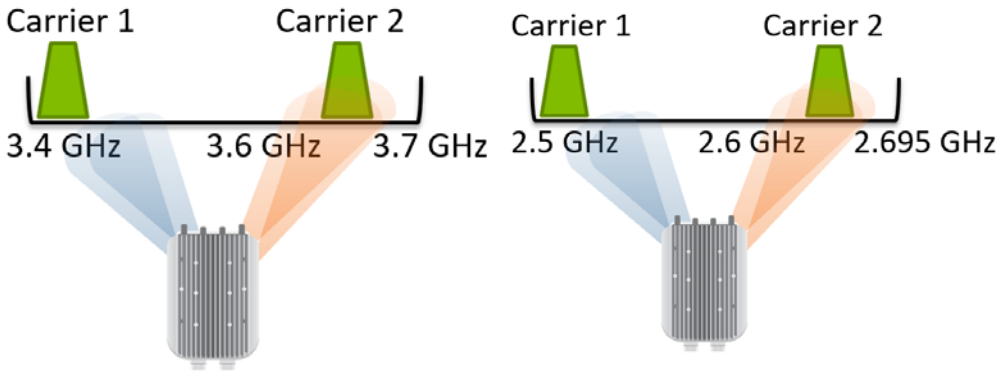
Appendix 2
Telrad White Paper on Carrier Aggregation

LTE-Advanced Carrier Aggregation(CA)

As part of Telrad' s Breeze COMPACT platform release 7.0, the carrier aggregation feature becomes available. Carrier aggregation allows for the combining of radio channels up to 20MHz in width. The benefit of such feature is to increase the peak throughput capability per user with the use of a category 6 or higher UE. Note the CPE 9000 is a category 6 UE.

With the use of carrier aggregation each individual carrier becomes known as a component carrier. Legacy UE (pre-category 6) will have full backward compatibility and continue to be serviceable by the LTE- Advanced eNodeB, they will however remain limited to a single component carrier. Category 6 UE can aggregate multiple component carriers and exploit peak rates equivalent to the max sum of the aggregated carriers

The Breeze COMPACT platform allows for the aggregation of up to 2 carriers. The carriers can be any of the following bandwidths. 5MHz, 10MHz, 15MHz, 20MHz. There is no requirement for channels be contiguous as the Compact supports intra-band aggregation of both contiguous and non-contiguous carriers



With the use of Breeze Compact Carrier aggregation feature, operators gain the ability to demonstrate higher peak rates upward to the theoretical capacity of 2x20MHz channels. In terms of throughput examples, the capabilities should be considered as one of two TDD split scenarios based on uplink to downlink requirements.

Subframe allocation (SA) 1 is known as 2:2 and Subframe Allocation 2 is known as 3:1.

Relevant throughputs for the different ratios are as follows

20MHz SA1 = 75.67Mbps Downlink and 27.88Mbps Uplink
20MHz SA2 = 105.03Mbps Downlink and 13.94Mbps Uplink

The current Carrier aggregation implementation is downlink only therefore the peak capacity listed for 20MHz can be doubled only on the downlink per user with the use of CA. In the future with the introduction of 256QAM the downlink may increase further up to 33% with the use of a next generation UE

This translates to the following max theoretical throughput per user with the use of CA
20MHz+20MHz SA1 = 151.34Mbps Downlink and 27.88Mbps Uplink
20MHz+20MHz SA2 = 210.06Mbps Downlink and 13.94Mbps Uplink

With target offering such as
10Mbps DL 1Mbps UL
25Mbps DL 3Mbps UL
100Mbps DL 20Mbps UL

The following blends of service offerings would be feasible within a typical oversubscription model as is used in many networks today (10:1).

Note calculations shown here are based on MAX modulation and coding scheme (MCS). Real world results are subject to an MCS distribution based on Installation and RF conditions. To increase likelihood of max MCS consider 22dB CINR or better as an installation threshold.

SA1

	SLA downlink (Mbps)	SLA Uplink (Mbps)	# of users
Service plan 1	10	1	20
Service plan 2	25	3	15
Service plan 3	100	20	5
			40

SA2

	SLA downlink (Mbps)	SLA Uplink (Mbps)	# of users
Service plan 1	10	1	50
Service plan 2	25	3	40
Service plan 3	100	20	0
			90